ORIGINAL ARTICLE

Factors Influencing the Outcome of Surgical Management of Lower Limb Ischemia

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ABSTRACT

The objective of this study is to determine factors influencing the outcome of surgical management of lower limb ischemia. It was a cross-sectional analytical study conducted in surgical Unit 4, services hospital, Lahore from 18th September 2006 to 17th march 2007.Fifty patients of lower limb ischemia were included in the study. Appropriate surgical procedure was performed after complete pre-operative evaluation. Risk factors identified and clinical variables were statistically evaluated. Time is single most important factor in acute and in chronic ischemia. Diabetes mellitus, hypertension hyperlipidemia, smoking are factors which influence outcome.

Key words: Ischemia, Embolism, Hyperlipidemia, Atherosclerosis.

INTRODUCTION

Patients presenting with acute lower limb ischemia presents a challenge to surgeons as the therapeutic window to allow successful restoration of arterial blood supply can be quiet small and is highly dependant on any preexisting peripheral arterial disease[1]. Embolism and trauma are 2 important causes of acute lower limb ischemia. Dissecting aneurysm of aorta or endovascular repair of abdominal aortic aneurysm can also lead to lower limb ischemia[2]. In cases of trauma, early revascularization (within 6 hours) alone or combined with fasciotomy or bone repositioning in cases of fractured bones which is frequently associated with lower limb injuries , leads to reduced chances of amputation[3].

The most important cause of chronic lower limb ischemia is atherosclerosis. The major risk factors for the development of atherosclerosis appear to be smoking, elevated blood lipids, hypertension and diabetes mellitus.

Chronic limb ischemia can be divided into intermittent claudication and critical limb ischemia. In contrast to intermittent claudication, all the patients with CLI should be considered for surgery. Sometimes a combination of angioplasty and bypass is employed in treatment of CLI[4].

MATERIAL AND METHODS

This was a cross sectional analytical study conducted in THE Department of Surgery, Services Hospital, Lahore from 18th September 2006 to 17th March 2007. 50 patients of lower limb ischemia based on clinical judgment were included in the study that needed surgical treatment. All admitted patient with isolated lower limb ischemia of all ages, both sexes were included in the study. Patients having ischemia of any other part of body and patients treated as out-patient department were not included in the study. Fifty patients were included in the study.

The data was entered in SPSS software version 11. Basic demographic variables age, sex, type, severity and duration of symptoms, positive signs ad their extent and outcome of investigation were presented as descriptive statistics and mean $\pm$, standard deviation for the numerical data. The indication for one of the surgical procedures was clarified. The outcome of the surgical procedure was assessed as success and failure for each procedure and in relation to some of the know risk factors. Any differences observed were tested by applying Chi-square test as the outcome variables were quantitative for significance. A p value of less than or equal to 0.05 considered as significant.

RESULTS

The age range of patients was categorized into five groups. Those from 22-32 years were 8 (16%) patients. From 34 -42 were 7 (15%) patients, from 43-52 were 16 (32%) patients, from 53-62 were 16 (32%) patients and above 60 years 3 (6%). Twenty seven (54%) patients were male and 23 (46%) were females.

Twenty(40%) patients were admitted through outpatient department and 30 (60%) patients were admitted through accident and emergency department and second group included the patients who suffered blunt trauma or penetrating injury or embolism.

Thirteen (26%) patients presented with symptoms of intermittent claudication while 37(74%)

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patients presented with pain with or without swelling. The second groups including all those patients who either suffered penetrating injuries, blunt trauma, embolism or rest pain of critical limb ischemia. Severity of symptoms was categorized into moderate 33 (66%) patients and severe 17 (34%) patients.

The duration of symptoms were assessed in hours for acute ischemia and weeks for chronic ischemia. 26(52%) patients were of chronic ischemia and 24 (48%) patients were of acute ischemia. the duration of chronic was from 0-104 weeks with mean±SD of 16.34±25.84. The duration of acute ischemia was from 0-18 hours with mean±SD of 2.48±3.81.

Different surgical procedures were performed; surgical embolectomy was done on 9 (18%) patients and primary repair of artery with either reverse venous graft or end-to-end anastomosis done on 16(32%) patients. Bypass surgery either with synthetic graft or venous graft was done in 25(50%) patients. (Table 1)

Table 1: Distribution according to procedures performed (n=50)

Procedures	**=n**	**%age**
Surgical Embolectomy	9	18
Primary repair	16	32
Bypass surgery	25	50
Total	50	100

Table 2: Distribution of patients according to risk factors (n=50)

Identification	**=n**	**%age**
No risk factor	4	8
Atrial fibrillation	4	8
Hyperlipidemia	1	2
Cigarette Smoking	6	12
Diabetes	4	8
Hypertension	5	10
Diabetes+ any other associated factor	18	36
Hypertension+smoking	3	6
Hypertension+smoking+AF	3	6
AF+hypertension	2	4
Total	50	100

The outcome was assessed as limb salvaged in 29(58%) patients while amputation was done in 21(42%) patients. Different risk factors were identified. Atrial fibrillation was identified in 4(8%) patients , hyperlipidemia in 1(2%) patients , smoking in 6(12%) patients , diabetes alone in 4(8%) patients while diabetes associated with other risk factors (smoking, hyperlipidemia, hypertension were 36% patients). Hypertension alone was 5(10%) patients, while hypertension associated with smoking in 3(6%) of patients and hypertension associated with smoking and Atrial fibrillation in 3(6%) of patients and Hypertension associated with Atrial fibrillation in 2(4%) cases and in 4(8%) cases no risk factor was found. (Table 2)

DISCUSSION

Lower limb ischemia can be being due to so many different reasons. It can be primarily divided into acute ischemia or chronic ischemia. The acute ischemia is caused mostly trauma, may it be penetrating or blunt trauma caused by road traffic accidents or may be due to embolic phenomenon. The time is the single most important factors in determining the outcome of surgical management of acute ischemia.3.the symptoms and signs of acute ischemia can be remembered by six P's which are pain , pallor, pulselessness, perishing, cold, paralysis and parasthesia as clinical parameter. Not all of these will necessary be present in every patients due to presence of collaterals or incomplete obstruction. But they are still invaluable to determine viability and urgency of intervention. The presence or absence of Doppler detected single at ankle need to be recorded and absence of Doppler detected venous flow at ankle is a poor prognostic sign[5].

Acute arterial occlusion due to embolus differs from occlusion due to thrombosis on a pre existing atheroma. It is essential to differentiate between these two causes as they may require different form of treatment. The patient with no history of claudication with pale, paralyzed with paraesthetic leg should be immediately shifted to the operation theater otherwise delay in performing arteriogram could well render the limb irrecoverable, before the patient even reaches the theater. It is inappropriate to consider lysis in the limb with sensory and motor deficit. Duplex scanning in the acute situation can provide very use full and potentially rapid information[6].

Balloon catheter embolectomy is the procedure which has replaced more tedious reconstruction in acute ischemia. It is noted that 35% of patients will have residual thrombus following balloon catheter embolectomy. These patients can benefit from on table thrombolysis with streptokinase (1 00000units in100 ml) over 20 minutes or recombinant TPA 5mg blouses in 20ml normal saline up to 3 times over 30 sec. Repeat angiography can be performed to ensure clearance[6].

There is debate as to initial thrombolysis or initial surgery is the treatment of acutely ischemic limb. There are few randomized studies comparing surgery to thrombolysis. In a small study of 20 patients of less than 14 days duration randomized to surgery or lysis.

Nissen et al demonstrated a higher patency 65% in surgery versus 40% in lysis group.

The Topas phase one trail consists of 213 patients of less than 14 days duration, who were randomized to either surgery or one of three thrombolytic regimens. The outcome was assessed by one year mortality (14%) and amputation free survival (75%). These results did not differ significantly from those obtained in surgical group. In phase two trial 544 recruited of less than 14 days duration randomized to initial lysis or initial surgery. Again there was no difference in amputation free survival at one year 65% with thrombolysis and 70% with surgery. However there were fewer surgical procedures performed at 6 months in the group initially treated with lysis. Complication in the form of stroke occurred only in lysis group. [10] These all trails suggest a marginal edge of surgery over thrombolysis. Initial surgery or initial lysis depends on the length of occlusive process longer occlusions to appear to respond best to initial thrombolysis[7].

For chronic ischemia the major risk factors are smoking, hyperlipidemia, hypertension and diabetes. Hypertension, diabetes, dyslipidemia should be corrected and smoking should be stopped[8]. At present infra-inguinal by pass using autologus vein is most effective and durable treatment of chronic limb ischemia. A trail was conducted at department of surgery Stanford California in which they performed 823 infrainguinal arterial reconstruction for lower extremity ischemia in 585 patients of which 353 procedures were performed on women and 446 procedures were performed on men. The results indicate that long term graft patency and limb salvage results in women are identical to those obtained in men [9.] The patency for above knee femoro-popliteal graft is 80% , for below knee graft regarding graft patency there was significant difference for bypass with vein 76% to PTFE 54%.

In this study various factors were identified which effect the outcome . In case of acute ischemia, if the patients presented within 6 hours even if there were associated risk factors the outcome is favorable but whenever the patients presented later than 6 hours even when other risk factors such as smoking, diabetes and hyperlipidemia, hypertension were absent the outcome was worse. This applied both to surgical embolectomy and primary repair of the vessels. Therefore the most important factor determining the outcome in acute ischemia is duration. Time is the single most important factor leading to outcome of surgical procedures in lower limb ischemia[3].

In chronic ischemia various risk factors were identified affecting the outcome. If there is single risk factor e.g. Diabetes mellitus and the surgery performed for above knee occlusion for intermittent claudication the outcome is favorable. But with the same site of obstruction if more than one risk factor are involved the outcome become less favorable.

Regarding symptoms if the bypass is done for intermittent claudication the results are overwhelmingly favorable but when reconstructive surgery is done for critical limb ischemia the outcome is worse.

Regarding severity and duration if symptoms are moderate and of longer duration the outcome is favorable but when the symptoms are severe and of longer duration i.e. more than 30 weeks the outcome is worse.

CONCLUSION

Time is the single most important factor in the outcome of surgical management of acute ischemia but in chronic ischemia different factors such as diabetes mellitus, hypertension, hyperlipidemia and smoking is the one which influence the outcome of surgical management of chronic limb ischemia and their preoperative identification and correction is important in achieving favorable outcome.

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